

REMARKS

Claims 1-15 are presently pending. By this Amendment, claims 1, 5, 12 and 15 are amended. Claims 1 and 15 are amended to overcome a claim objection and to correct grammatical errors therein. Claims 5 and 12 are also amended to correct grammatical errors therein.

No new matter is added to the application by this Amendment.

Entry of the claim amendments and reconsideration of the application are thus respectfully requested.

I. Claim Objection

Claims 1 and 15 were objected to as allegedly being indefinite. Specifically, the Patent Office alleges that the recitations of “at least one layer of a first material” and “at least one layer, adjacent to said first layer” without properly or clearly distinguishing them makes the claim confusing and unclear. The Patent Office also alleges that there is insufficient antecedent base for the feature “said first layer” in claim 1. Applicant respectfully disagrees with these allegations.

Claims 1 and 15 have been amended to be directed to “at least one first layer of a first material” and “at least one second layer, adjacent to said first layer. Applicant submits that claims 1 and 15 are definite and are not confusing or unclear as alleged by the Patent Office.

Applicant respectfully request withdrawal of the objections to the claims.

II. Rejections under 35 U.S.C. § 103

A. Taran et al. in view of Modderman et al.

Claims 1-8, 10, 11, 14 and 15 were rejected under 35 U.S.C. §103(a) as allegedly being unpatentable over U.S. Patent No. 6,070,466 to Taran et al. (hereinafter “Taran”) in view of U.S.

Patent No. 5,303,590 to Modderman et al. (hereinafter “Modderman”). This rejection is respectfully traversed.

The Patent Office acknowledges that Taran fails to teach or suggest a first material having a first velocity for a first vibration mode and at least one layer, adjacent to said first layer, of a second material having a velocity for a second vibration mode, approximately equal to said first velocity (see page 3 of the Office Action). The Patent Office introduces Modderman as allegedly remedying the deficiencies of Taran by allegedly teaching a multi-layered structure that is used for layered materials comprising layers of at least two materials having different acoustic properties, i.e., laminated structures, bonded structures, embedded layers, etc. The Patent Office alleges that it would have been obvious to utilize the techniques of Modderman in Taran because variations in the thicknesses of the fiber layers lead to variations in the magnitude of the transmission coefficient in the transmission frequency bands relating to said fiber layers and generally, the more the acoustic properties of the different materials in a multi-layered structure differ one from another, the less the mutual influence on their specific acoustic transmission frequency bands will be. Moreover, the Patent Office also alleges that one of ordinary skill in the art using the above combination would have known by frequency band selective analysis of the transmitted or reflected signals, influences on said signals due to variations in the layer parameters of a multi-layered structure under inspection, such as variations in the thickness of individual layers, can be adequately detected and/or eliminated in a reliable manner to make the above combination more effective. Applicants respectfully disagree with these allegations by the Patent Office.

Independent claim 1 requires an acoustic testing apparatus for testing a laminate material having a second transducer for receiving said test signal from said testing zone, and in that said

first transducer is adapted to project said test signal at an angle so as to generate vibrations of at least said first vibration mode in said first layer, wherein said vibrations of said first vibration mode are incident on an interface with said second layer of said second material under an incidence angle so as to produce vibrations of at least said second vibration mode in said second layer, so that refraction of said test signal at said interface is suppressed.

Independent claim 15 requires an acoustic testing method for testing a laminate material having the step of using a second transducer to receive said test signal reflected from said testing zone, and by adapting said first transducer to project said test signal at an angle so as to generate vibrations of at least said first vibration mode in said first layer, wherein said vibrations of said first vibration mode are incident on an interface with said second layer of said second material under an incidence angle so as to produce vibrations of at least said second vibration mode in said second layer, so that refraction of said test signal at said interface is suppressed.

Taran teaches a device for ultrasonic inspection of a multilayer metal workpiece via a time-domain based analysis. As acknowledged by the Patent Office, the device of Taran does not project the test signal such that a first vibration mode is impinged in the first layer and a second vibration mode in the second layer wherein the velocities of the first and second vibration modes approximately coincide. Taran fails to teach or suggest that the material characteristics of metal layers are such that the velocities of different vibration modes in corresponding metal layers may coincide. Moreover, Taran also fails to teach or suggest exploiting such material characteristics of metal layers of a workpiece.

Modderman teaches an apparatus for low frequency ultrasonic inspection of multi-layered structures (see the Abstract). The apparatus is arranged for performing a measurement of bulk properties of a multi-layered structure via a spectral analysis. Thereto, the entire structure is

modeled as a single complex acoustic filter having a specific spectral behavior (see col. 3, lines 17-25 and col. 8, lines 49-60). By analyzing an actual received spectral signal, a deviation might be identified corresponding to an anomaly in a specific layer (see FIG. 7 and col. 8, lines 9-26). However, since the measuring principle in Modderman is in the spectral domain, identification and localization of a defect is complicated and results in inaccuracies.

Because the time-domain interpretation of the present claims and Taran's time-domain based analysis are so different from Modderman's spectral analysis, the skilled artisan would not look to use teachings of Modderman's method in the ultrasonic inspection device according to Taran. Accordingly, there is no motivation to combine the teachings of Taran and Modderman to allegedly achieve the presently claimed invention.

It is also traversed that any insight that variations in the thickness of fiber layers lead to variations in a transmission coefficient magnitude provides an indication for one of ordinary skill in the art that substantially coinciding velocities of different vibration modes in adjacent metal layers might be exploited to suppress refraction when the test signal is incident at a specific projection angle. As a result, even if Modderman was combined with Taran, as alleged by the Patent Office, the resulting combination would fail to achieve the features of the presently claimed acoustic testing apparatus and acoustic testing method as recited in claims 1 and 15, respectively.

Based on the foregoing, Applicants submit that a *prima facie* case of obviousness has not been established, and respectfully request that the Patent Office withdraw this rejection.

For all the foregoing reasons, Applicants respectfully submit that neither Taran nor Modderman, taken singly or in combination, would have led one of ordinary skill in the art to

required features of claims 1-8, 10, 11, 14 and 15. Reconsideration and withdrawal of this rejection are respectfully requested.

B. Taran and Modderman in view of Silwa, Jr. et al.

Claim 9 was rejected under 35 U.S.C. 103(a) as allegedly being unpatentable over Taran and Modderman in view of U.S. Patent No. 5,575,288 to Silwa, Jr. et al. (hereinafter "Silwa"). This rejection is respectfully traversed.

Claim 9, which indirectly depends from claim 1, is patentable over the cited reference combination, because Silwa fails to remedy the deficiencies of Taran and Modderman as discussed above with respect to claim 1.

Thus, none of Taran, Modderman and Silwa, taken singly or in combination, teaches or suggests the specifically defined features as required by claim 1.

Because these features of independent claim 1 are not taught or suggested by Taran, Modderman and Silwa, these references would not have rendered the features of claim 1 and its dependent claim obvious to one of ordinary skill in the art.

For at least these reasons, claim 9 is patentable over the cited references. Thus, withdrawal of the rejections under 35 U.S.C. §103(a) is respectfully requested.

C. Taran and Modderman in view of Silwa, Jr. et al.

Claims 12 and 13 were rejected under 35 U.S.C. 103(a) as allegedly being unpatentable over Taran and Modderman in view of U.S. Patent No. 6,572,548 to Cerofolini. These rejections are respectfully traversed.

Claims 12 and 13, which directly depend from claim 1, are patentable over the cited reference combinations, because Cerofolini fails to remedy the deficiencies of Taran and Modderman as discussed above with respect to claim 1.

Thus, none of Taran, Modderman and Cerofolini, taken singly or in combination, teaches or suggests the specifically defined features as required by claim 1.

Because these features of independent claim 1 are not taught or suggested by Taran, Modderman and Cerofolini, these references would not have rendered the features of claim 1 and its dependent claim obvious to one of ordinary skill in the art.

For at least these reasons, claims 12 and 13 are patentable over the cited references. Thus, withdrawal of the rejections under 35 U.S.C. §103(a) is respectfully requested.

III. Conclusion

In view of the foregoing, it is respectfully submitted that this application is in condition for allowance. Favorable reconsideration and prompt allowance of claims 1-15 are earnestly solicited.

Should the Examiner believe that anything further would be desirable in order to place this application in even better condition for allowance, the Examiner is invited to contact the undersigned at the telephone number set forth below.

Early and favorable action is earnestly solicited.

CONDITIONAL PETITION FOR EXTENSION OF TIME

If entry and consideration of the amendments above requires an extension of time, Applicants respectfully request that this be considered a petition therefor. The Commissioner is authorized to charge any fee(s) due in this connection to Deposit Account No. 14-1263.

ADDITIONAL FEE

Please charge any insufficiency of fees, or credit any excess, to Deposit Account No. 14-1263.

Respectfully submitted,
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